

CLAIMS

What is claimed is:

1. An apparatus for performing a chemical or physical process with a sample within a field of microwave radiation comprising:
 - (a) a first container having a second container therewithin, the container and the second container defining a volume therebetween and the second container having a containing portion, said second container having a filter disposed between the second container and the first container and for filtering fluid passing from one of the first container and the second container to the other of the first and second containers;
 - (b) at least a first inlet port and a second inlet port, the first inlet port in communication with the volume and the second inlet port in communication with the containing portion for providing fluids to the volume and the containing portion, respectively; and
 - (c) at least a first and a second outlet port, the first outlet port in communication with the volume and the second outlet port in communication with the containing portion for receiving fluids from the volume and the containing portion, respectively.
2. An apparatus as defined in claim 1, wherein the volume is a substantially closed region between the first container and the second container.
3. An apparatus as defined in claim 1, wherein the containing portion of the second container is a substantially closed region.
4. An apparatus as defined in claim 1, wherein the inlet and the outlet ports are in fluid communication with the volume and the containing portion through the filter.
5. An apparatus as defined in claim 1, wherein the second container is removable from the first container.

6. An apparatus as defined in claim 1, wherein the first container and the second container are integral.
7. An apparatus as defined in claim 1, wherein the filter is removably disposed at approximately the bottom of the second container.
8. An apparatus as defined in claim 1, wherein the filter is comprised substantially of glass fiber.
9. An apparatus as defined in claim 1, wherein the filter is for maintaining at least a portion of the sample in the containing portion of the second container.
10. A method for performing a plurality of chemical and physical processes within a microwave radiation field comprising the steps of:
- (a) providing a first container;
 - (b) providing a second container in fluid communication with the first container;
 - (c) providing a filter for preventing some fluid communication between the first and second containers, the filter between the first and second containers is disposed along a path of fluid communication therebetween; and,
 - (d) providing pressure control to at least one of the first and second containers so as to increase or decrease fluid communication between the first container and the second container.
11. A method as defined in claim 10, wherein the filter is made substantially of glass fiber.
12. An apparatus for performing a chemical or physical process with a sample within a microwave radiation field comprising:
- (a) a container having an inside vessel, the container and the inside vessel having a substantially closed volume therebetween, the inside vessel having a filter for filtering at least a portion of the sample; and

(b) at least one port in fluid communication with one of the volume and the container; the port being connected to a pressure control device, the pressure control device for enabling the port for evacuating at least one of the volume and the inside vessel in one mode of operation and for providing fluids to at least one of the volume and the inside vessel in another mode of operation.

13. An apparatus as defined in claim 12, wherein the port is in communication with the volume between the container and the inside vessel for receiving a fluid in one mode of operation or providing a fluid in another mode of operation from or to the volume, respectively.

14. An apparatus as defined in claim 13, further comprising at least one additional port, wherein the additional port is in fluid communication with the inside vessel, the additional port being connected to another pressure control device for enabling the port for evacuating the inside vessel in one mode of operation and for providing fluids to the inside vessel in another mode of operation.

15. An apparatus as defined in claim 12, wherein the filter is comprised substantially of glass fiber.

16. An apparatus as defined in claim 12, wherein the filter is disposed at approximately the bottom of the inside vessel.

17. An apparatus as defined in claim 12, wherein the inside vessel is removable from the container.

18. An apparatus as defined in claim 14, wherein the container and the inside vessel are integral.

19. A device for preventing the passage of fluids in one mode of operation and for regulating the passage of fluids in another mode of operation therethrough comprising:

(a) a housing for receiving a sample;

(b) a filter being removably disposed inside the housing, the filter formed of fibres pressed into a predetermined shape to be fitted inside the housing and to withstand a substantial pressure differential for operation of said filter.

20. A device as defined in claim 19, wherein the housing is made substantially of a material selected from a group consisting of glass, teflon, and teflonTN.

21. A device as defined in claim 19, wherein the fibres are substantially glass fibres.

22. A device as defined in claim 21, wherein the filter is made substantially of a material selected from a group consisting of quartz fiber, borosilicate fiber, and pyrex fiber.

23. A method for performing a chemical or physical process within a microwave radiation field comprising the steps of:

- (a) placing a sample in an apparatus having a container and a second container therewithin, the container and the second container having a substantially closed volume therebetween, the container and the second container being in fluid communication with each other through a filter disposed at approximately the bottom of the second container for maintaining at least a portion of the sample;
- (b) sealing the apparatus;
- (c) heating the sample in the apparatus by applying microwave energy;
- (d) providing fluids to the volume or the second container through at least two inlet ports, the first inlet port in communication with the volume and the second inlet port in communication with the second container;
- (e) receiving fluids from the volume or the second container through at least two outlet ports, the first outlet port in communication with the volume and the second outlet port in communication with the second container.

24. A method for performing successively a plurality of physical or chemical processes in the same apparatus within a microwave cavity comprising the steps of:

- a) placing a sample in the containing portion of a second container of an apparatus having a first container and the second container, the first container in fluid communication with the second container through a filter disposed within a fluid communication path therebetween for maintaining at least a portion of the sample from flowing between the first and the second containers;
- b) sealing the apparatus;
- c) heating the sample in the apparatus by applying microwave energy;
- d) controlling the pressure inside at least one of the containers of the apparatus, whereby a pressure differential between the first container and the second container results in one of promoting and inhibiting fluid communication there between.

25. A method as defined in claim 24, wherein a filtration process is carried out by increasing the pressure differential between the first and the second container to induce fluids to pass from the second container to the first container.